

$^{11}\text{B}(\text{p},\alpha)$ **1990Aj01**

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- 1967Ma11: $^{11}\text{B}(\text{p},\alpha)2\alpha$ E=6.4-7.9 MeV, measured $\sigma(E_p)$, $\sigma(E_\alpha, \theta)$.
- 1969Ga03: $^{11}\text{B}(\text{p},\alpha)$ $E_p=38$ MeV, measured $\sigma(E_\alpha, \theta)$. PWBA analysis.
- 1969Nu01: $^{11}\text{B}(\text{p},\alpha)$ E=7.3 MeV, measured $\sigma(\theta)$.
- 1971Ca16: $^{11}\text{B}(\text{p},\alpha)$ E=12,20,24,30 MeV, measured $\sigma(\theta)$. PWBA analysis.
- 1971GO20: $^{11}\text{B}(\text{p},\alpha)$ E=0.163 MeV, Measured $\sigma(E_{\alpha 1}, \theta_{\alpha 1}, \theta_{\alpha 2})$. ^{12}C deduced resonances, level-width.
- 1971Ka21: $^{11}\text{B}(\text{p},\alpha)$ E=40 MeV, measured $\sigma(E_\alpha, \theta(\alpha))$.
- 1972De01, 1972De02: $^{11}\text{B}(\text{p},\alpha)^8\text{Be}$, $E_p=45.0$ MeV, measured $\sigma(\theta_{c.m.}=20^\circ-160^\circ)$. Finite-range DWBA.
- 1972Ge19: $^{11}\text{B}(\text{p},\alpha)$ E=1.39,2.00,2.64 MeV, measured $\sigma(E_\alpha, \theta(\alpha))$.
- 1972Hu04: $^{11}\text{B}(\text{p},\alpha)$ E=163 keV, measured α - α -coin spectra.
- 1974An19: $^{11}\text{B}(\text{p},\alpha)$ E=163 KeV, measured σ . ^{12}C levels deduced Γ_p , Γ_γ , S.
- 1975Ma49, 1975Ma37: $^{11}\text{B}(\text{p},\alpha)$ E=1.8-3.0 MeV, measured $\sigma(E, \theta)$. $^{11}\text{B}(\text{pol. p},\alpha)$ E \approx 2.6 MeV, measured polarization. ^{12}C deduced resonances.
- 1975Va04: $^{11}\text{B}(\text{p},\alpha)$ E=7.5-10.5 MeV, measured $\sigma(E, E_\alpha)$, α - α -coin.
- 1976Gr22: $^{11}\text{B}(\text{p},\alpha)$, measured $\sigma(\theta)$. Deduced 3 α reaction mechanism.
- 1976Ko18: $^{11}\text{B}(\text{p},\alpha)$ E=6 MeV, measured $\sigma(\alpha, \theta)$.
- 1977Av01: $^{11}\text{B}(\text{p},\alpha)$ E=660 MeV, measured absolute σ .
- 1977Bu07: $^{11}\text{B}(\text{p},\alpha)$ E=6.0-18.0 MeV, measured $\sigma(E, \theta)$. ^{12}C deduced isoscalar giant resonance.
- 1977Fu09: $^{11}\text{B}(\text{p},\alpha)$ E=6.5-7.3 MeV, measured $\sigma(E, E_\alpha, \theta)$.
- 1981Ov02: $^{11}\text{B}(\text{p},\alpha)$ E=33 MeV, measured $\sigma(E_\alpha)$.
- 1983Bo19: $^{11}\text{B}(\text{p},\alpha)$ E=4.5-7.55 MeV, measured $\sigma(E, \theta)$. Deduced reaction σ . ^{12}C deduced levels, J, π , reduced widths.
- 1983Bu06: $^{11}\text{B}(\text{p},\alpha)$ E=6-24 MeV, measured $\sigma(E, \theta)$. Deduced $\sigma(E)$, reaction mechanism. DWBA analyses.
- 1985Pu03: $^{11}\text{B}(\text{p},\alpha)$ E=1.98,2.62,0.68 MeV, analyzed breakup $\sigma(\theta_{\alpha 1}, \theta_{\alpha 2}, E_\alpha)$.
- 1987Be17: $^{11}\text{B}(\text{P},3\alpha)$ $E_{c.m.}=22-1100$ keV, measured E_α , I_α , $\sigma(E, \theta)$. ^{12}C deduced resonance, Γ .
- 1988Bo37: $^{11}\text{B}(\text{p},\alpha\gamma)$ E \approx 2.7-3.8 MeV, measured $\sigma(\theta)$ vs E.
- 1988Ha04: $^{11}\text{B}(\text{p},\alpha)$ E=20-100 MeV, measured E_γ , I_γ , $\sigma(\theta)$, analyzing power vs θ . ^{12}C deduced GDR, parameters, EWSR.
- 1989Lu05: $^{11}\text{B}(\text{p},\alpha)$ E=2.385-2.843 MeV, measured $\sigma(E_\alpha)$, $\sigma(E)$.
- 1993An06, 1999An35: $^{11}\text{B}(\text{p},\alpha)$ $E_{c.m.}=17-134$ keV, measured spectra, α yield.
- 1996Vo23: $^{11}\text{B}(\text{p},\alpha)$ E=150-800 keV, measured $\sigma(\theta)$.
- 1996Yu04: $^{11}\text{B}(\text{p},\alpha)$ E=0.165-2.58 MeV, analyzed α -spectra following ^8Be breakup. Deduced breakup σ .
- 1998Li51: $^{11}\text{B}(\text{p},\alpha)$ E=667,1370 keV, measured α spectra, $\sigma(E_\alpha, \theta)$, σ . Deduced sequential decay process features.
- 1998Ma54: $^{11}\text{B}(\text{p},\alpha)$ E=1700-2700 keV, measured $\sigma(\theta=165^\circ)$.
- 2002Gr09: $^{11}\text{B}(\text{p},\alpha)$ E=100-200 keV, measured E_α .
- 2002Li29: $^{11}\text{B}(\text{p},\alpha)$ E=0.4-1.6 MeV, measured E_α , σ , $\sigma(\theta)$.
- 2008La18: $^{11}\text{B}(\text{p},\alpha)$, deduced S-factors.
- 2010Ko33: $^{11}\text{B}(\text{p},\alpha)$ E=2.2-4.2 MeV, measured proton spectrum, E_α , I_α . Deduced yields, $\sigma(\theta)$.
- 2010La11: $^{11}\text{B}(\text{p},\alpha)$ $E_{c.m.}=0-0.6$ MeV, deduced S-factor using Trojan Horse Method.
- 2011St01: XUNDL dataset compiled by TUNL, 2011. Beams of $E_p=675$ keV and 2.64 MeV, from the TUNL FN-Tandem facility impinged on a 56 $\mu\text{g}/\text{cm}^2$ enriched ^{11}B target populating $^{12}\text{C}^*(16.576, 18.38 \text{ MeV})$. Measured E_α , I_α , α - α coin. Emitted α -particles were detected in an array of 8 Si surface barrier detectors positioned at $20^\circ-60^\circ$. Discussion of the reaction mechanism is given based on Monte Carlo simulations of the observations. Deduced implications on reaction model, astrophysical reaction rates.
- 2016La24: XUNDL dataset compiled by TUNL, 2016.
- The $^{12}\text{C}^*(16.11 \text{ MeV})$ 3 α decay kinematics and decay mechanism was studied using $E_p=167$ to 170 keV beams from the Aarhus University Van de Graaff accelerator. The beams impinged on 10-15 $\mu\text{g}/\text{cm}^2$ natural boron targets, populating the $^{12}\text{C}^*(16.11 \text{ MeV})$ level. The full decay kinematics were detected using a set of 5 cm \times 5 cm double-sided Si strip detectors, that were placed in about ten different configurations throughout the measurement period. The branching ratio for α_0 decay is determined by analyzing the multiplicity 2 ($\Gamma_{\alpha 0}/\Gamma=0.054$ 11) and multiplicity 3 ($\Gamma_{\alpha 0}/\Gamma=0.051$ 5) events.

$^{11}\text{B}(\text{p},\alpha)$ 1990Aj01 (continued) **^{12}C Levels**

| E(level) | J ^π | Γ | Comments |
|-------------------------|-------------------|-----------|---|
| 16105.8 7 | 2 ⁺ | 5.3 keV 2 | T=1; $\Gamma_{\gamma 0}=0.58$ eV; $\Gamma_{\alpha 0}=290$ eV 45; $\Gamma_p=21.7$ eV 18 $\Gamma_{\gamma 1}=12.6$ eV 18; $\Gamma_{\alpha 1}=6.3$ keV 5 E(level): E _{res} =148.3 keV 1 and $\Gamma_{\text{c.m.}}=5.3$ keV 2 (1987Be17) and E _{res} =149.8 keV 2 and $\Gamma_{\text{c.m.}}=5.2$ keV +5–3 (1979Da03). Also see $\Gamma_{\alpha 0}/\Gamma=0.051$ 5 (2016La24). |
| 16576 | 2 ⁻ | 300 keV | T=1; $\Gamma_{\gamma 0}<0.4$ eV; $\Gamma_{\alpha 0}<0.27$ keV; $\Gamma_p=150$ keV $\Gamma_{\gamma 1}=8.0$ eV; $\Gamma_{\alpha 1}=150$ keV (1965Se06) Simulations indicate the primary α -particle is emitted with $l=3$ to ${}^8\text{Be}(2^+)$. Implications are discussed (2011St01). |
| 17230 | 1 ⁻ | 1150 keV | T=1; $\Gamma_{\gamma 0}=44$ eV; $\Gamma_{\alpha 0}=10$ keV; $\Gamma_p=1$ MeV $\Gamma_{\gamma 1}=5.$ eV; $\Gamma_{\alpha 1}=140$ keV (1965Se06) |
| 17.79×10 ³ | 0 ⁺ | 96 keV 5 | T=1; $\Gamma_{\alpha 0}=4.6$ keV; $\Gamma_p=76$ keV $\Gamma_{\alpha 1}=11.4$ keV (1965Se06) |
| 18.38×10 ³ | 3 ⁻ | ≈310 keV | T=1; $\Gamma_{\gamma 0}\approx 2\times 10^{-3}$ eV; $\Gamma_{\alpha 0}=65$ keV; $\Gamma_p=68$ keV $\Gamma_{\gamma 1}=3.2$ eV; $\Gamma_{\alpha 1}=177$ keV (1965Se06) Simulations indicate the primary α -particle is emitted with $l=1$, mostly to ${}^8\text{Be}(2^+)$, in agreement with prior studies (2011St01). |
| 18.39×10 ³ | 0 ⁻ | 43 keV | $\Gamma_{\gamma 0}<0.5$ eV; $\Gamma_{\alpha 0}<1$ keV; $\Gamma_p=33$ keV $\Gamma_{\gamma 1}<0.5$ eV; $\Gamma_{\alpha 1}<5$ keV (1965Se06) $\Gamma_p'\approx 9$ keV (1965Se06). |
| 18.71×10 ³ | | 100 keV | T=1; $\Gamma_p<10$ keV From $\sigma_{\text{res}}(p,\alpha_0)=3.4$ mb (1965Se06). |
| 18.81×10 ³ | 2 ⁺ | 100 keV | T=1; $\Gamma_{\gamma 0}=0.4$ eV; $\Gamma_{\alpha 0}<0.2$ keV; $\Gamma_p=97$ keV $\Gamma_{\gamma 1}=2.0$ eV; $\Gamma_{\alpha 1}<1.5$ keV (1965Se06) $\Gamma_p'\approx 2.0$ keV (1965Se06). |
| 19.2×10 ³ | (1 ⁻) | 1100 keV | T=1; $\Gamma_{\gamma 0}=25$ eV; $\Gamma_{\alpha 0}=50$ keV; $\Gamma_p=300$ keV $\Gamma_{\gamma 1}=10.$ eV; $\Gamma_{\alpha 1}=200$ keV; $\Gamma_n=1.1$ keV (1965Se06) $\Gamma_p'\approx 400$ keV (1965Se06). |
| 19.39×10 ³ | (2 ⁺) | 1100 keV | T=0; $\Gamma_{\gamma 0}<3$ eV; $\Gamma_{\alpha 0}=20$ keV; $\Gamma_p=450$ keV $\Gamma_{\gamma 1}=3.$ eV; $\Gamma_{\alpha 1}=450$ keV (1965Se06) $\Gamma_p'\approx 50$ keV (1965Se06). |
| 20.47×10 ³ | | 180 keV | E(level): From (1963Sy01 , 1964Al20). |
| 20.64×10 ³ | (3 ⁻) | 275 keV | T=1 E(level): From (1963Sy01 , 1964Al20). |
| 21.31×10 ³ ? | | 30 keV | E(level): From reference in (1980Aj01). |
| 21.5×10 ³ | | | E(level): From (1964Al20). |
| 22.1×10 ³ | | 500 keV | E(level): From (1964Al20). |
| 22.6×10 ³ | (1 ⁻) | 3200 keV | T=1; $\Gamma_{\gamma 0}>2500$ eV E(level): From (1964Al20). E(level): From (1975Va04). E(level): From (1964Al20 , 1975Va04). E(level): From (1975Va04). E(level): From (1964Al20 , 1977Sn01). E(level): From (1977Sn01). |
| 23.0×10 ³ | | | |
| 23.6×10 ³ | | | |
| 25.4×10 ³ | | | |
| 26.72×10 ³ | (1 ⁻) | | |
| 27.9×10 ³ | | ≈6000 keV | |